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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/529,257	04/11/2000	MASAKAZU ONIZUKA	1684/48707	5277

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EXAMINER

LEUNG, JENNIFER A

ART UNIT	PAPER NUMBER
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1764

DATE MAILED: 09/10/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/529,257

Applicant(s)

ONIZUKA ET AL.

Examiner

Jennifer A. Leung

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 April 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because the following reference signs are not mentioned in the description: "d" (FIG. 6); "113" (FIG. 12).
3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description:
 - a. FIG. 4: "liquid 11" and "air 10" (page 8, line 23)
 - b. FIGs. 2(A), 3(A): "surface 41a" (page 15, line 20)
 - c. FIG. 11A: "air 10" (page 5, lines 1 and 5)
 - d. FIGs. 5, 6: "circulation pump 53", "distribution pipe 55" (page 16, lines 23-24).
4. FIG(s). 10, 11(A-B), 12, 13(A-C) and 14 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g).
5. The drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the drawings.
6. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

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Specification

7. The abstract of the disclosure is objected to because of undue length. Correction is required. See MPEP § 608.01(b).

The applicant is reminded of the proper language and format for an abstract of the disclosure:

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details. The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

8. The disclosure is objected to because of the following informalities:
- a. P. 15, line 20: --or cavity -- should be inserted before "41a", set forth on page 14, line 10.
 - b. P. 16, line 30: "4a" should be changed to -- 4 --, set forth on page 12, lines 26-27.
 - c. P. 17, line 7: -- 7 (A) and -- should be inserted after "Figure" for proper reference to the drawings.

Appropriate correction is required.

9. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

10. Claims 1 and 4 are objected to because of the following informalities.
- a. In claim 1, a --space-- should be inserted between "liquid" and "which" (line 4). Also, "," (line 7) should be deleted for proper grammatical form (comma splice).

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- b. In claim 4, "interior" should be changed to --internal-- for consistency in the claims (see claim 1, line 8).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claims 1-7 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 1, the claim lacks a reaction means and is therefore considered incomplete and nonfunctional. The preamble recites a desulfurization apparatus for removing the oxides of sulfur, yet no element is recited in the body of the claim for performing this function. Furthermore, the phrase "such as" (line 2) renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d). Furthermore, "wet" is considered a relative term and is therefore considered vague and indefinite (see also claims 2-7). Furthermore, "[the] oxides of sulfur" (lines 1-2), "combustion exhaust gas" (line 2), "the discharge end" (line 12) and "air" (line 9) have no clear antecedent basis. Furthermore, "the absorption liquid" (lines 5 and 7) lacks proper positive antecedent basis as it is merely recited in the preamble of the claim.

With respect to claim 2, "the combustion exhaust gas" (line 5) lacks proper positive antecedent basis as it is merely recited in the preamble of claim 1. Furthermore, it is unclear as to what the applicant is attempting to recite by, "said branch pipe branches" (line 2). Furthermore, it

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is unclear as to the structural-spatial relationship between the branch pipe, circulation pump, distribution pipe, collection tank, and spraying means.

With respect to claim 3, it is unclear as to what the applicant is attempting to recite by "configured as a semicircular trough" (line 3). Furthermore, "the downstream" (lines 3-4) lacks proper antecedent basis.

With respect to claim 5, it is unclear as to the structural relationship between "a region of negative pressure" (line 5) and the other elements of the apparatus.

With respect to claim 6, "approximately" (line 2) is considered vague and indefinite.

With respect to claim 7, the language of the claim is drawn towards a method limitation and therefore it is unclear as to what structural limitation the applicant is attempting to recite by, "wherein the flow rate..." (lines 2-3) since flow rate is not an element of the apparatus. Furthermore, "the flow rate" (line 2) and "the absorption liquid" (line 2) lack proper positive antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

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This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

12. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroo et al. (JP 07-031841).

With respect to claim 1, Hiroo et al. further disclose a gas desulfurizing apparatus for absorbing the sulfur oxides of an exhaust gas with an absorption liquid **2** ([Sections 0001-0003]), said apparatus comprising a branch pipe **8** of a specific diameter for circulating the absorption liquid **2**, said branch pipe **8** extending into a collection tank and having an end **12** which discharges the absorption liquid **2** into the collection tank (FIG. 1). Furthermore, Hiroo et al. disclose an air-blowing pipe **11** for injecting air into the pipe **8**, said air-blowing pipe having an end inserted into the pipe **8** at an insertion point (at mixing point **9**).

Hiroo et al. are silent as to the air-blowing pipe being inserted into the branch pipe at an insertion point located between 3D and 10D from the discharge end of the pipe **8**. However, Hiroo et al. additionally disclose overcoming a prior art problem of a clogged air nozzle by allowing mixing of the air and liquid **2** in the discharge pipe **12** at an unspecified distance prior to injection in the tank ([Section 0015, 0027]).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to insert the air-blowing pipe into the branch pipe at an insertion point between 3D and 10D from the discharge end of a branch pipe in the apparatus of Hiroo et al. because

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providing the air-blowing pipe at an insertion point distanced from the end of the branch pipe allows sufficient length for mixing to occur before discharge and also allows enlargement of the branch pipe diameter, thereby minimizing clogging, as taught by Hiroo et al. In any event, shifting location of parts was held to have been obvious in absence of showing any unexpected result, *In re Japikse*, 181 F.2d 1019, 1023, 86 USPQ 70, 73 (CCPA 1950), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

With respect to claim 2, the same comments apply. Furthermore, Hiroo et al. disclose that the branch pipe 8 branches from a distribution pipe 5 downstream of a circulation pump 4 on the distribution pipe 5 which connects the collection tank and a spraying means 6 for spraying the absorption liquid 2 into the exhaust gas (refer to FIG. 1).

13. Claims 1 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tamaru et al. (JP 08-000950).

With respect to claim 1, Tamaru et al. disclose a wet gas desulfurizing apparatus for absorbing the sulfur oxides of an exhaust gas with an absorption liquid ([Sections 0002-0003]), said apparatus comprising a branch pipe 12 of diameter D ([Section 0016], FIG. 3) for circulating an absorption liquid, said pipe 12 extending into a collection tank 4 and having an end which discharges the absorption liquid into the collection tank (FIG. 1). Furthermore, Tamaru et al. disclose an air-blowing pipe 14 for injecting air into the pipe 12, said air-blowing pipe having an end inserted into the pipe 12 at an insertion point (at mixing point 13).

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Tamaru et al. are silent as to the air-blowing pipe being inserted into the branch pipe at an insertion point located between 3D and 10D from the discharge end of the pipe 12. However, Tamaru et al. further disclose that generating a “foam” by mixing the absorption liquid and air prior to injection improves the diffusion of air in the collection tank ([Section 0008]).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to insert the air-blowing pipe into the branch pipe at an insertion point between 3D and 10D from the discharge end of a branch pipe in the apparatus of Tamaru et al. because inserting the air-blowing pipe at a point of sufficient distance upstream of the discharge end allows the air and fluid to be well mixed in the discharge pipe prior to injection, and when compared with the case of gas injection without prior mixing, the generated “foam” mixture more easily diffuses into the collection tank, allowing better distribution of the gas in the liquid, as taught by Tamaru et al. In any event, shifting location of parts was held to have been obvious in absence of showing any unexpected result, *In re Japikse*, 181 F.2d 1019, 1023, 86 USPQ 70, 73 (CCPA 1950), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

With respect to claim 4, the same comments apply. Furthermore, Tamaru et al. disclose that the interior diameter **d** of the air-blowing pipe 14 may be changed with changes in the flow rate through pipe 12. Furthermore, Tamaru et al. specifically cite a diameter **d** in the range of 0.3D to 0.7D, where D is the diameter of pipe 12.

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14. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroo et al. (JP 07-031841) or Tamaru et al. (JP 08-000950), as applied to claim 1 above, and further in view of Henry III (U.S. 3,825,286) and Koster (U.S. 3,005,369).

The same comments apply. However, Hiroo et al. and Tamaru et al. are silent as to the air-blowing pipe (Hiroo et al. 11, Tamaru et al. 14) configured as a semicircular trough facing the downstream towards the collection tank.

Henry III teaches a pipe structure (FIG. 4) comprising a primary pipe 41 (ie. branch pipe) and a secondary pipe 47 (ie. air-blowing pipe) for introducing separate paths of fluids into a single path, wherein the secondary pipe 47 may be configured to face the downstream side during fluid flow (flow towards surface 53).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the pipe structure to the apparatus of Hiroo et al. or Tamaru et al. because the pipe structure represents a quick and easy means for creating a piping system using readily available parts, thereby avoiding complex valves and fittings, and may be applicable to thick or viscous fluid flows (ie. slurries), as taught by Henry III (column 1, lines 1-31).

In addition, Hiroo et al., Tamaru et al. and Henry III are silent as to the secondary pipe 47 being configured as a semicircular trough.

Koster teaches a tubular assembly (FIG. 1), substantially the pipe structure of Henry III, comprising a secondary tube 12 (ie. air-blowing pipe) branching from a primary tube 11 (ie. branch pipe), wherein the tubes 11, 12 may be configured as a notched end or semicircular trough (FIG. 3).

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It would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the air-blowing tube to be a semicircular trough in the modified apparatus of Hiroo et al. or Tamaru et al. because the semicircular trough allows a secondary tube, upon insertion into a primary tube, to conform to the contour of the primary tube to which it is connected in angular relation, thereby creating a snug or close fit, as taught by Koster.

15. Claims 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroo et al. (JP 07-031841) or Tamaru et al. (JP 08-000950), as applied to claim 1 above, and further in view of Von Berg (U.S. 5,403,522).

With respect to claim 5, the same comments apply. However, Hiroo et al are silent as to the branch pipe 8 comprising an orifice upstream from the air-blowing pipe 11 insertion point 9, wherein the insertion point 9 is located in a region of negative pressure created by the orifice.

Von Berg teaches an apparatus for mixing a liquid and a flowable treating agent (ie. oxygen, air) comprising a branch pipe 32 comprising an orifice 78 upstream from an air-blowing pipe 66 insertion point 56 (see FIG. 2), wherein the insertion point 56 is located in a region of negative pressure created by the orifice 78 (Abstract; column 1, lines 11-27; column 2, line 64 to column 3 line 2).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide the orifice to the apparatus of Hiroo et al. because the orifice, placed upstream from the air-blowing pipe, would enable air or other gaseous treatment agents to be drawn by suction into the branch pipe for turbulent mixing with the absorption liquid, thereby

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improving the entrainment of the air in the liquid, as taught by Von Berg. Furthermore, as evidenced by Von Berg, the use of such mixing apparatus is conventional knowledge in the art.

In addition, Tamaru et al. are silent as to the branch pipe **12** comprising an orifice upstream from the air-blowing pipe **14** insertion point **13** (FIG. 3) wherein the insertion point **13** is located in a region of negative pressure created by the orifice. However, Tamaru et al. additionally disclose that the piping structure at the insertion point **13** is not critical as long as a turbulent flow is generated and air may be introduced into the turbulent flow ([Section 0016]).

The same comments with respect to Von Berg (as applied to Hiroo et al. above) apply.

With respect to claim 6, the same comments apply. In addition, Hiroo et al., Tamaru et al. and Von Berg are silent as to the orifice **78** comprising a diameter of approximately $2/3$ to $3/4$ that of the branch pipe. Von Berg does teach, however, that the orifice **78** is relatively smaller than the diameter of the conduit **32** (FIGs. 2-7).

It would have been obvious for one of ordinary skill in the art at the time the invention was made to provide an orifice comprising a diameter of approximately $2/3$ to $3/4$ that of the branch pipe in the modified apparatus of Hiroo et al. or Tamaru et al. because an orifice of diameter smaller than the branch pipe diameter is necessary for generating the low pressure turbulent mixing zone, as taught by Von Berg. In any event, it has been held that changes in size involve only ordinary skill in the art, *In re Rose*, 220 F.2d 459, 463, 105 USPQ 237, 240 (CCPA 1955), and where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

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With respect to claim 7, since no structural element is further recited, the modified apparatus of Hiroo et al. or Tamaru et al. structurally meet this claim. In any event, it would have been obvious to set the flow rate of the absorption liquid through the orifice to a rate of 8 to 14 m/sec because it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art, *In re Aller*, 105 USPQ 233.

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Lott and Langvand are presented to illustrate the current state of the art.

* * *

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer A. Leung whose telephone number is 703-305-4951. The examiner can normally be reached on 8:30 am - 5:30 pm M-F, every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Marian C. Knode can be reached on 703-308-4311. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

JAL
September 6, 2002




HIEN TRAN
PRIMARY EXAMINER